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ABSTRACT

The third in a series of six reports on higher education in Iowa, this document presents enrollment projections for Iowa postsecondary education institutions from 1978 through 1986. Data were collected from the regents universities, independent colleges, and area colleges throughout the state. A computerized nonprescriptive projection model was used allowing manipulation of variables, parameters, and assumptions so the effects of each variable could be investigated. Definitions and thirteen assumptions on which the projections and models are based are described. Tabulated data and graphs provide enrollment projections by sex, type of institution, year, student status, and general field of study. Projections for university enrollment suggest that enrollment will rise at the master's degree level, and will decrease in certain disciplines at the doctoral level. It is projected that independent colleges will provide approximately one-third of all undergraduates in the state. It is suggested that the area colleges will experience an enrollment increase due to the popularity of career education programs; however, rising costs may limit the peak enrollment figure. The procedure for using the computer program and the model to determine enrollment projections is explained. (SF)

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Enrollment in Post Secondary Education in Iowa: Prospects and Potential Problems for the Period 1977 to 1990

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This study is the third of six made possible by the Interim Study Committee of the House Budget Committee of the Iowa General Assembly. Committee members were: Representative N. Jesse, Chairman; W. Horn, F. Koogler, J. Patchett, D. Stromer, and R. Welden.

The objectives underlying each of the six studies were to provide pertinent information and to increase knowledge regarding selected problems facing education in Iowa.

The six studies of education in Iowa were conducted by faculty members at the University of Iowa, Iowa State University, and the University of Northern Iowa. The six studies were coordinated by Professor George A. Chambers, Chairman of the Division of Educational Administration, University of Iowa. The titles of the six studies and the faculty researchers are:

"A Study of State of Iowa Appropriations with an Emphasis upon Expenditures for Education," George A. Chambers, Leo A. Gerst, and Marvin E. Jackson, University of Iowa.

"A Study of Iowa's Public Elementary and Secondary Enrollment Trends, 1977-78 through 1981-82," Professor Emeritus Wayne P. Truesdell, University of Northern Iowa.

"Enrollment in Post Secondary Education in Iowa: Prospects and Potential Problems for the Period 1977 through 1986," Duane D. Anderson, Robert E. Engel, and Robert S. Ellinger, University of Iowa.

"An Analysis of Transportation Costs to Iowa's Public Elementary and Secondary Schools," L. Dean Webb and Tony A. Nash, University of Iowa.

"A Cost Projection for Special Education Funding in the State of Iowa, 1975-76 through 1985-86," Clifford E. Howe, University of Iowa.

"A Study of Current and Potential Cooperation in Vocational-Technical Education between Area Schools and Public Schools in Iowa," Harold E. Dilts, Iowa State University.

The authors express their appreciation to the Committee and to Ms. Linda King, Administrative Assistant to the Committee, for help and direction in conducting the studies.

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AUTHORS' PREFACE

In the summer of 1977 the Interim Education Study Committee of the House Budget Committee of the Iowa House of Representatives decided that a study should be made to project the enrollment in post-secondary education in Iowa each year from 1978 through 1986.

The research project was undertaken in September 1977 by Professors Duane D. Anderson and Robert E. Engel of the University of Iowa. They were joined in the study by Dr. Robert Ellinger, a demographer and computer programmer, also from the university. The authors express their appreciation to all those who helped them and who gave so generously of their time. They also express their appreciation to the University of Iowa's Gerard P. Weeg Computing Center for allowing them the use of much valuable equipment.

* * *

INTRODUCTION

The Preliminary Projection: An Overview

Data Collection

Because the projection was to treat each of the three major sectors of post-secondary education in Iowa, the researchers contacted the Board of Regents, the Department of Public Instruction, the Association of Private Colleges and Universities, and the Higher Education Facilities Commission. They sought to determine what data were available and to elicit the support of these agencies in the identification, location, and collection of the data needed for the study.

Questionnaires were sent to each of the independent colleges to collect data in those areas where existing state wide information was incomplete. Census data were gathered from files at Iowa State University. The data were stored and analyzed at the University of Iowa. The projection model that was used to treat the data will be described later in this report.

The researchers depended heavily upon others for the accuracy of the data on which the projections were based. Nevertheless, they assume full responsibility for the assumptions selected, which were made a part of the projection model. The assumptions represent the best professional judgment of the research team at this time.

A major added value of this research is in the development of an instrument that can be used to continually update the projections as the assumptions become reality or change over time. It should also be noted that a decision was made early in the study to extend the projection period to 1990. This was done for two reasons: first, data was available for this period; and second, an increase in enrollment is projected between 1987 and 1990 which would not have shown otherwise.

Description of the Enrollment Projection Model

The enrollment projection model was constructed as a prototype to demonstrate the concept of a non-prescriptive projection model. A non-prescriptive projection model differs from most projection models in that the variables, parameters, and assumptions can be manipulated, elucidating the effects of each variable.

Types of Projections

There have been three major approaches to long range projections: trend extrapolation, policy alternatives (sometimes called the Delphi approach), and the futurist approach (constructing scenarios). These methodologies are as much art as science and can be grouped together with weather forecasting as rational ouija-boarding. But some of these techniques are art while others are more science; the longer the time period, the more the projection becomes an art and the less a science.

The first approach, trend extrapolation, is based on the idea of extrapolation of curves, with the general underlying assumption of momentum; i.e., things will continue to do what they have done in the past. The simplest form of this type of projection is the linear or straight line projection, normally based on the least squares regression methodology. While for some purposes this method can be effective for several months to as long as maybe two years, as the time period increases the projections become increasingly unreliable, except under

unusually circumstances. Normally the tacit underlying assumption that the phenomenon will continue to change in the same fashion and at the same rate will be false for most phenomena, althought the deviations only appear as the length of time increases. While there are advanced statistical techniques like polynomial regression, multiple and stepwise regression, and factor analysis to help overcome this limitation, they require large amounts of data. And still there is no guarantee of any improvement in the projection, especially beyond 10 years.

The second approach to projections, the policy alternatives or Delphi approach, involves polling policy makers or experts in the content area of the projection. After each participant has completed a questionnaire or stated an opinion, the opinions are then correlated to find the "best" opinion for the future trend of the phenomenon. This method is based on the assumption that years of experience with the phenomenon have given the expert an intuitive insight into the workings of the phenomenon that the expert may not even realize. Consequently, polling opinions of experts should produce a better projection of the phenomenon than simple trend extrapolation. Results to date using this method have been mixed: either excellent or awful. There are three probable reasons for failures. First, questions may have been wrong or poorly worded. Second, the majority of the experts may not have considered some variable that in the past had remained constant, but that begins to affect the phenomenon after the polling has taken place. Third, the basic assumption might be false; that is, the experts may not have good intuitive insight into the phenomenon.

The third approach to projection is the futurist approach or scenario building. Using this approach, a series of possible trends or events occur and predict the change in the phenomenon. Each of the series is called a scenario. The scenario can be ordered by the likelihood of occurence using either the trend extrapolation or Delphi methods, though it may be that several scenarios are equally probable. In such a case a range of probable values can be constructed for each time period of the projection. There are many problems with this approach. For example, there are the same problems with new variables entering the actual scenarios, and there is no good reliability factor built in. Also, what if all the "what ifs" (scenarios) are inappropriate?

The Non-prescriptive Projection Model

This non-prescriptive projection model is a hybrid of the three previous methods. It starts using the variables of a model that follow the projection made by trend extrapolation. However, any of the trend variables can be changed during the course of a run of the model to fit the expectations of experts. Further, any expert can create his or her own scenario and make a set of projections based on it. And any variable in the model can be explored to see its effects on the model, within the scenario. Normally, the non-prescriptive projection model is constructed on a computer system. In an interactive format the non-prescriptive projection model can make several separate projections within a small time span allowing the user to visualize the manner in which the variables affect the projection.

The main limitation with this method is that new variables are difficult to add to the model, so that if some variables that affect the phenomenon are not included in the model, erroneous projections will result. For this reason model design and implementation is a long and tedious process. But, when the model is finished, it can produce new projections on a regular basis, given updated information. Over time, refinements can be made in the model that will allow much higher reliability of projections at a low cost. The model functions like machinery in a factory - once it's in place and the bugs are worked out, the fixed costs are paid. Subsequent costs are only those variable costs for materials and labor to produce the product.

DEFINITIONS AND ASSUMPTIONS

The projections and models found in this report are based on certain definitions and assumptions. Fundamental to all the assumptions is a conservative approach, so the authors believe that the projections will tend to be low. The first section gives the definitions. The second section gives the assumptions used and the values of the variables derived from the assumptions.

Definitions

Freshmen

Included are all first-time, credit enrollments in all undergraduate programs. This category is not limited to enrollments in programs leading only to associate or bachelor degrees. It also includes enrollments in programs variously called vocational, career or occupational.

This category does not include enrollments in non-credit or non-degree/certificate courses or in typically adult and continuing education programs (even if offered for some kind of credit). Such enrollments are not included in these projections. (See definition of part-time.)

Undergraduate

This means all students enrolled in all programs leading to associate or bachelor degrees. as well as those leading to certificates in vocational, career, or occupational areas. No students are included in this category who are enrolled only in secondary school programs or are enrolled only in programs leading to graduate or professional degrees which typically require the baccalaurate for admission.

Graduate

This category includes all students who are enrolled in programs which typically require the student to possess the baccalaureate. So-called first professional degree programs (e.g., M. D.) as well as masters and doctoral degree programs in the arts and sciences are included.

Full-Time

Included are students who are carrying at least 75% of a normal student-hour load in their respective programs.

Part-Time

Included are students who are carrying less that 75% of a normal student-hour load in their respective programs. There is a difference between part-time students who are part of the "core" enrollment (i. e., those pursuing degrees or certificates on a part-time basis) and those who are part of the "peripheral" enrollment (i. e., those pursuing occasional course work for personal or professional development). This projection does not treat "peripheral" enrollments (i. e., adult and continuing education). Thus, part-time projections are based on assumptions about the "core" enrollments only.

Full-Time Equivalent Enrollment (FTEE)

This is essentially a corrected headcount. It is computed by multiplying the part-time enrollment by .333 and adding that figure to the full time enrollment. An adjusted headcount of this kind does not take into account such things as differences in costs between the many levels and kinds of programs (e. g., lower-division vs. upper-division, or arts and science vs. career education). Nevertheless, it does represent a more realistic enrollment figure than if the gross numbers of full-time and part-time students were simply added together.

Discussion of Assumptions

Assumption 1

The cohort survival ratio values, shown in Table 1, are an average of seven previous years 1970 - 1976. They are derived from Department of Public Instruction data. Analysis of the cohort values showed no trend during the time period,that is nearly as long as the time period of the projection. And since there is no reason to suspect a trend (only random variations) the averages are used.

Assumption 2

The college going rates for the State of Iowa were calculated for the period 1970 - 1976. They were calculated from Department of Public Instruction and Higher Facilities Commission data. A moving average was used to project future trends, for though no statistical analysis used could find any trends, inspection of the data showed hazy trends. These trends should continue in the near term, but because they are so ephemeral an average should be used near the end of the projection. These needs are met when a moving average is used.

Assumption 3

One of the trends noted in the data (see assumption 2) was that there was a sharp increase in the number of women starting college, though the trend was decreasing toward 1976. This is the reason for making the assumption that the rate will increase but will change at a decreasing rate.

Assumption 4

Because no data were available from the entire set of colleges and universities there was no way to know whether relatively more men or women were coming from out-of-state to attend college. What sample data we had revealed that there was no significant differences in the percentages. So the assumption was made to use the same percentages used for the in-state enrollments.

Assumption 5

Since there is so little temporal cross section data available there is no way to make any other assumption about the attraction rates of the three sectors than that the attraction rates will remain constant at 1976 levels.

Assumption 6

The only trend found in analyzing the number of freshmen not coming directly from high school is that there has been a major increase in the number of students in the area schools sector. The trend, while still increasing, has slowed down in

recent years. Both the trend and the slowing are expected to continue. Since no trends were found for the other two sectors constant average numbers are used (while realizing that random variations can be expected).

Assumption 7

Since there is so little data available across time the only assumption that could be made was that retention rates would remain constant. Social, economic, and educational conditions could significantly alter the values.

Assumption 8

This is the most difficult assumption to make, and the most complex. Because each sector has different abilities and functions, and because little temporally compatible data is available, assumptions had to be made for each sector and are as follows:

A. Regents schools - there will be a rapid rise in part time enrollments with the Bachelors of Liberal Studies and external degree and certification programs, but enrollments will level off within 10 years (these new students will be mostly upper division) at 12% of the full time enrollments.

B. Independent schools - will increase part time enrollments, but will for the sector as a whole, not allow part-time enrollments to rise over 25% of full-time enrollments.

C. Area schools - part time enrollments will approach 40% of full time enrollments for the sector.

Assumption 9

Projections of graduate enrollments ar exceptionally difficult. They tend to follow social and economic trends, instead of demographic trends, and are heavily influenced by the decisions made by various graduate departments. For this reason we chose to follow a national projection, made by Alan Cartter. Cartter's projections are known for their accuracy.

Assumption 10

The assumption is made that head count of the part time student enrollment multiplied by 1/3 will approximate the full time equivalent figure.

Assumptions 11, 12, and 13

These assumptions are implicit in the projections. Much more detailed analysis of economic, social, and educational variables would be needed to show what effect changes in these assumptions would have on the sector projections.

Variables and Assumptions

The variables used in this projection of the post-secondary enrollments for the decade 1977-78 to 1990-91 can be divided into two classes: one set that projects the total number of potential students with a reasonable level of confidence, and the other set that projects the sector in which the student would enroll. The latter is susceptible to variation, depending on conditions which were in many instances unpredicatble.

The first class of variables determines the numbers of people who would be potential enrollees in one of the three sectors of post-secondary education in Iowa. The individuals who are expected to advance through the elementary and secondary school systems in the state are already in attendance. The number who will be graduated and eligible for post-secondary attendance is therefore predictable with some degree of accuracy. Even these figures, however, are subject to modification. For example, if policies such as competency requirements were to be mandated for high school graduation there might be significant changes in the number of individuals eligible for post-secondary enrollment. Even under the assumption that the graduation rate of high school students will remain constant over the next ten years, the pool of individuals from which the institutions of higher education in Iowa will be drawing their enrollees is far from absolute. Not only will variations in the out-of-state migration rate influence the pool, but those Iowans who for any reason deferred entry to post-secondary education after graduating from high school become part of that potential pool.

A second class of variables represents those factors that may determine whether or not potential pool members will enroll and, if they do, to which sector they will go. The enrollment projections for each sector in this report are predicated on a number of assumptions. These assumptions are subject to modification as the passage of time reveals changing conditions. For example, one of the most powerful variables represents the decisions made about curricular programs in each of the sectors.

Whether these decisions are made at the institutional level or are arrived at in a coordinated fashion made little difference in the overall enrollment projections, but may make a major difference in the projections for each of the sectors.

For this set of projections 13 basic assumptions were made.

In order to illustrate the significance of these assumptions, the 12th may serve as an example. This assumption states that the number of institutions and their function will remain the same during the period of the projection. At the present time four major cities in the state are not served by comprehensive community colleges. While citizens of these communities have access to independent college offerings and public vocational-technical offerings and, in one instance, public university programs, there is reason to believe that overall area school enrollment projection would be altered if changes were made in this situation. Whether this type of action would alter enrollments in either of the other sectors is debatable. Experience in some areas seems to suggest that the presence of an open door, comprehensive institution results in a rise in the percentage of high school graduates enrolling in post-secondary education and a ripple effect on the enrollments in the upper division four-year institutions in the area and the state.

Or take assumption #13 that states there will be no major change in the funding of the institutions. A change in student support policies at either state or federal levels would most likely cause projected enrollments in each of the sectors to vary. The directions and magnitude of the enrollment changes are, however, less predictable.

Another variable (see assumption #11, see pages 18-20) that has potential for skewing the projections involves the impact of economic conditions made by those who provide some of the income which supports the educational system of the state.

The decisions of people from the pool of eligible candidates to enroll or not to enroll in some degree depends upon their perceptions of the "value" of the education in an economic sense. For many, this decision will be affected by the size of the pay differential between those who possess post-secondary education credentials and those who do not. These and other highly subjective variables will all impact the projection model at the point where college going rate is incorporated.

In this study the cohort survival method of projecting enrollments was used " . . . although more complicated, (than some other methods it) usually yields more reliable results."[1] The latest, most accurate data available were used, as it is recognized that "enrollment forecasts can never be any more reliable than the data on which they are based." (Halstead, p. 720). The research team remains fully cognizant of the admonition of Dr. Kent Halstead when he states, "Even with the most exacting techniques, however, predicting college enrollments is a hazardous undertaking, because of the number, variety, and uncertainty of the variables involved." (Halstead, p. 302).

It is because of the uncertainty of the variables that the authors suggested that, in addition to making the most accurate projection possible, they would attempt to provide an interactive instrument which could be used to recalculate the projections. This means the user would be able to vary the important variables to fit a different set of assumptions about what the future may bring. This model and the assumption which can be altered will be discussed in later chapters of the report.

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1. All quotations are from Kent D. Halstead, *Statewide Educational Planning in Higher Education,* Department of Health, Education and Welfare pub. no. (OE) 73-17002 (Washington, D. C.: U. S. Government Printing Office, 1974). Subsequent attribution appears in the text.

Results

The team's projections follow in two forms: data tables, and graphs. These projections are the product of the model described in the introduction of this report. The projections presented here are based on the values which were entered in the model, as discussed in "Definitions and Assumptions" above. Other values could be used, and would produce different results.

Assumptions and Values of Variables

Assumption 1: The cohort survival rates for elementary and high school will remain constant during the period of the projection at the values shown in table 1.

Table 1

Cohort Survival Rates

Class	Rate
12 to grad.	0.9348
11 to 12	0.9446
10 to 11	0.9586
9 to 10	0.9763
8 to 9	0.9953
7 to 8	0.9925
6 to 7	1.0187
5 to 6	0.9982
4 to 5	0.9930
3 to 4	1.0028
2 to 3	0.9899
1 to 2	0.9732
K to 1	0.9969

Assumption 2. The college going rate for the time period will change as shown in table 2 calculated using a moving average.

Assumption 3. The percentage of women going to college will continue to increase, but at a decreasing rate as shown in table 2.

Table 2

College Going Rate*

Year	Regents		Independ.		Area	
	Male	Female	Male	Female	Male	Female
1978	8.5832	8.8191	5.2360	7.1585	6.4381	7.7985
1979	8.3888	8.9209	5.0637	7.2789	6.2370	8.1352
1980	8.3889	8.9373	5.0292	7.3576	5.7921	8.4876
1981	8.4534	8.8926	5.1095	7.2651	5.9987	8.2975
1982	8.4103	8.9169	5.0675	7.3005	6.0088	8.3072
1983	8.4175	8.9156	5.0688	7.3077	5.9331	8.3642
1984	8.4271	8.9084	5.0819	7.2911	5.9802	8.3230
1985	8.4183	8.9137	5.0727	7.2998	5.9740	8.3315
1986	8.4210	8.9126	5.0745	7.2995	5.9624	8.3395
1987	8.4221	8.9115	5.0764	7.2968	5.9722	8.3313
1988	8.4205	8.9126	5.0745	7.2987	5.9696	8.3341
1989	8.4212	8.9122	5.0751	7.2983	5.9681	8.3350
1990	8.4213	8.9121	5.0753	7.2979	5.9700	8.3335

*in percent of high school graduates

Assumption 4. The percentage of out-of-state males and females will remain the same as in-state males and females for the time period as shown in table 2.

Assumption 5. The out-of-state attraction rate will remain constant at the values shown in table 3.

Table 3

In-State to Out-of-State Ratios

By Sector

Sector	Ratio
Regents	1:.25
Independ.	1:.57
Area	1:.04

Assumption 6. The number of non-17-20 year olds going to area schools will continue to increase but at a decreasing rate as shown in table 4.

Table 4

Percent of Freshmen Enrollees
Over 20 Going to Area Schools

Year	Percent
1978	.48633
1979	.50045
1980	.51143
1981	.51851
1982	.52308
1983	.52758
1984	.53201
1985	.53635
1986	.54061
1987	.54792
1988	.54889
1989	.55293
1990	.55689

Assumption 7. The student retention rates will remain constant as shown in Table 5.

Table 5

Retention Rates by Sector
By Class

	Class	Regents	Independ.	Area
Full Time	Fr - Soph	0.74038	0.76308	0.41633
	Soph - Jr	1.09997	0.86864	0
	Jr - Sen	0.80581	0.97256	0
Part Time	Fr - Soph	1.0127	0.20921	0.551123
	Soph - Jr	1.42187	1.16602	0
	Jr - Sen	1.72462	1.37591	0

Assumption 8. The part-time enrollment rates will increase but at differing rates by sector as shown in table 6.

Table 6

Percent of Entering Part Time Freshmen by Sector

Year	Regents	Independ.	Area
1978	.0655	.2710	.3760
1979	.0670	.2740	.4040
1980	.0700	.2800	.4200
1981	.0750	.2900	.4205
1982	.0825	.3050	.4210
1983	.0930	.3250	.4215
1984	.1070	.3450	.4220
1985	.1200	.3650	.4225
1986	.1200	.3850	.4230
1987	.1200	.4000	.4235
1988	.1200	.4000	.4240
1989	.1200	.4000	.4245
1990	.1200	.4000	.4250

Assumption 9. The state's graduate enrollments will follow nationally projected norms as shown in table 7.

Table 7

Graduate Growth Rates

Year	% Change
1978	.0217
1979	.0215
1980	.0213
1981	.0210
1982	.0208
1983	.0206
1984	.0203
1985	.0201
1986	.0199
1987	.0196
1988	.0194
1989	.0192
1990	.0189

Assumption 10. Full time equivalent enrollment (FTEE) is based on full time student enrollment plus a percentage of part time student enrollment.

Table 8

Number of Iowa Students Direct From High School by Year

Year	Regents	Independ.	Area	Total
1978	8182	5800	6655	20576
1979	8133	5816	6767	20716
1980	8222	5896	6798	20916
1981	8041	5754	6646	20441
1982	7828	5604	6485	19917
1983	7503	5373	6207	19083
1984	7122	5098	5892	18112
1985	6616	4737	5476	16829
1986	6406	4587	5301	16294
1987	6194	4435	5126	15755
1988	6319	4525	5230	16074
1989	6499	4653	5378	16530
1990	6426	4601	5318	16345

Table 9

Total In-State Freshmen by Sector by Year

Year	Regents	Independ.	Area	Total
1978	8527	6032	12956	27515
1979	8539	6049	13546	28134
1980	8633	6132	13914	28679
1981	8443	5984	13802	28229
1982	8219	5828	13597	27644
1983	7878	5588	13138	26604
1984	7478	5302	12591	25371
1985	6947	4926	11810	23257
1986	6727	4771	11539	23037
1987	6504	4612	11261	22377
1988	6635	4706	11593	22934
1989	6824	4839	12029	23692
1990	6747	4785	12001	23533

Table 10

Total Freshmen by Sector
by Year

Year	Regents	Independ.	Area	Total
1978	10659	9471	13475	33605
1979	10674	9497	14087	34258
1980	10792	9628	14471	34891
1981	10554	9395	14354	34303
1982	10274	9151	14141	33566
1983	9848	8774	13664	32286
1984	9347	8325	13094	30766
1985	8683	7735	12283	28701
1986	8409	7490	12001	27900
1987	8130	7242	11711	27083
1988	8294	7388	12057	27739
1989	8530	7598	12511	28634
1990	8434	7512	12481	28427

Table 11

Total Full Time Undergraduate Enrollment by Sector
by Year

Year	Regents	Independ.	Area	Total
1978	34114	29957	19889	83960
1979	34243	29109	19697	83049
1980	34394	29293	20336	84023
1981	34416	29331	20379	84126
1982	33611	28604	20117	82332
1983	32565	27722	19551	79838
1984	31122	26493	18783	76398
1985	29352	24973	17734	72059
1986	27609	23506	17114	68229
1987	26723	22752	16707	66182
1988	26272	22384	16932	65588
1989	26870	22897	17530	67297
1990	27296	23246	17689	68231

Table 12

Total Part Time Undergraduate Enrollment by Sector by Year

Year	Regents	Independ.	Area	Total
1978	4424	4674	7847	16945
1979	4161	4626	8484	17271
1980	4285	4748	9214	18247
1981	4520	4851	9386	18757
1982	4755	4940	9280	18975
1983	5099	5053	9040	19192
1984	5521	5121	8700	19342
1985	5979	5088	8235	19302
1986	6152	5110	7936	19198
1987	5956	5171	7757	18884
1988	5811	5240	7845	18896
1989	5936	5370	8128	19434
1990	6065	5402	8231	19698

Assumption 11. Economic and social conditions will remain constant during the time period of the projection.

Assumption 12. The number of institutions and the function of each institution will remain unchanged during the time period of the projection.

Assumption 13. There will be no major change in the funding pattern of institutions during the time period of the projection.

Table 13

Total Undergraduate Enrollment by Sector by Year

Year	Regents	Independ.	Area	Total
1978	38539	34632	27736	100907
1979	38405	33736	28181	100322
1980	38680	34042	29550	102272
1981	38937	34183	29764	102884
1982	38366	33544	29397	101307
1983	37665	32776	28591	99032
1984	36643	31615	27483	95741
1985	35331	30061	25969	91361
1986	33761	38617	25050	87428
1987	32680	27923	24465	85068
1988	32083	28724	24778	84485
1989	32807	28267	25658	86732
1990	33361	28649	25920	87930

Table 14

Full Time Equivalent Undergraduate Enrollment by Sector by Year

Year	Regents	Independ.	Area	Total
1978	35589	31516	22505	89610
1979	35630	30651	22525	88806
1980	35823	30876	23408	90107
1981	35923	30948	23507	90378
1982	35196	30251	23210	88657
1983	34265	29407	22565	86237
1984	32962	28201	21683	82846
1985	31345	26669	20479	78493
1986	29660	25210	19760	74630
1987	28709	24475	19293	72477
1988	28209	24130	19547	71886
1989	28849	24687	20239	73775
1990	29317	25047	20433	74797

Table 15

Total Graduate Enrollment by Sector by Year

Year	Regents	Independ.	Total
1978	13253	2685	15938
1979	13538	2742	16280
1980	13826	2801	16627
1981	14117	2860	16977
1982	14410	2919	17329
1983	14707	2979	17686
1984	15006	3040	18046
1985	15307	3101	18408
1986	15612	3162	18774
1987	15918	3224	19142
1988	16227	3287	19514
1989	16538	3350	19888
1990	16851	3413	20264

Table 16

Total Projected Enrollments by Sector by Year

Year	Regents	Independ.	Area	Total
1978	51792	37317	27736	116845
1979	51943	36478	28237	116658
1980	52507	36843	29813	119163
1981	53054	37043	30315	120412
1982	52777	36464	30040	119281
1983	52372	35755	29207	117334
1984	51649	34655	28064	114368
1985	50639	33163	26509	110311
1986	49374	31780	25561	106715
1987	48598	31148	24954	104700
1988	48311	30912	25262	104485
1989	49346	31618	26150	107114
1990	50212	32063	26408	108683

Table 17
Number of Arts and Science Students
Versus
Number of Career Students
in Area Schools by Year

Year	Arts & Science	Career
1978	12641	15094
1979	12928	15252
1980	13645	15904
1981	13833	15930
1982	13750	15645
1983	13460	15131
1984	13020	14462
1985	12381	13587
1986	12018	13031
1987	11810	12653
1988	12036	12741
1989	12540	13117
1990	12746	13173

Figure 1

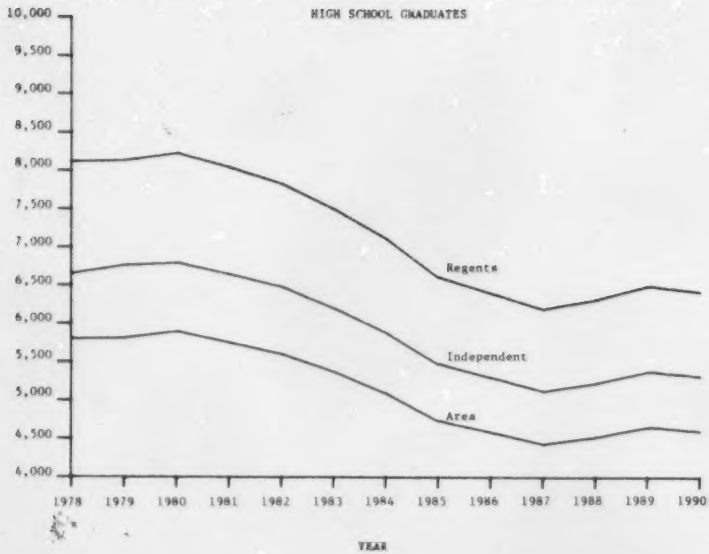


Figure 2

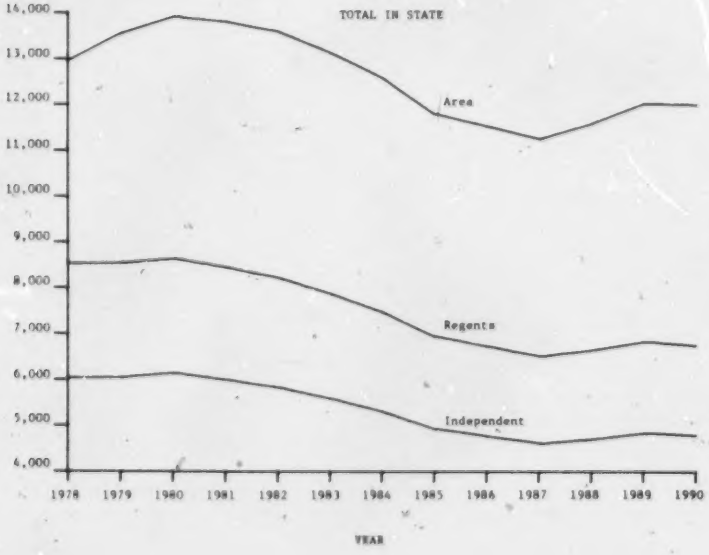


Figure 3

TOTAL FRESHMEN

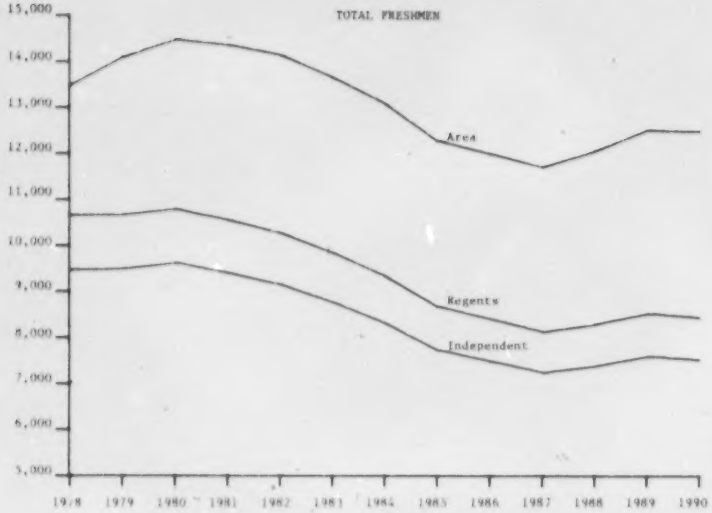


Figure 4

FULL TIME UNDERGRADUATES

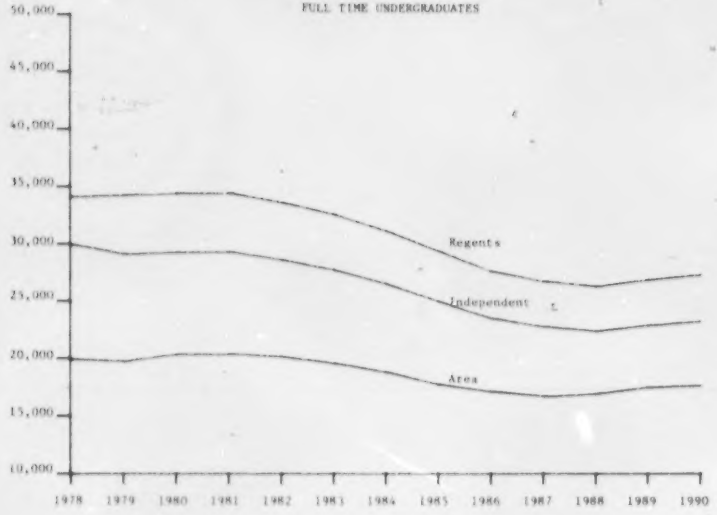


Figure 5

PART TIME UNDERGRADUATE ENROLLMENT

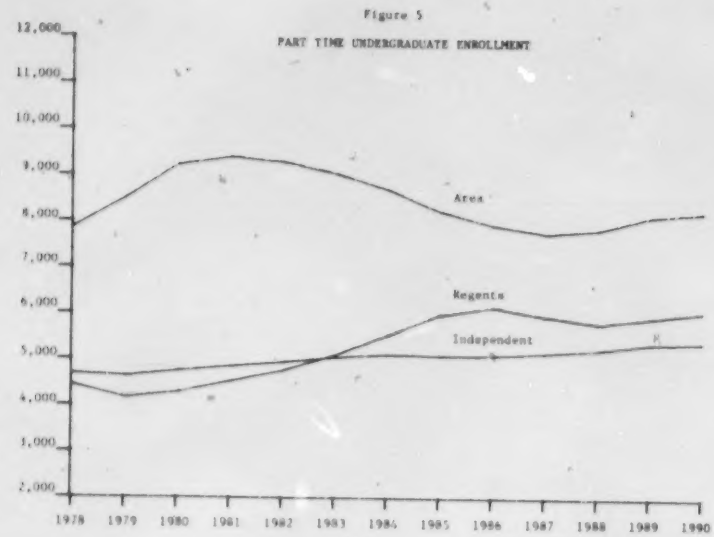


Figure 6

TOTAL UNDERGRADUATE ENROLLMENT

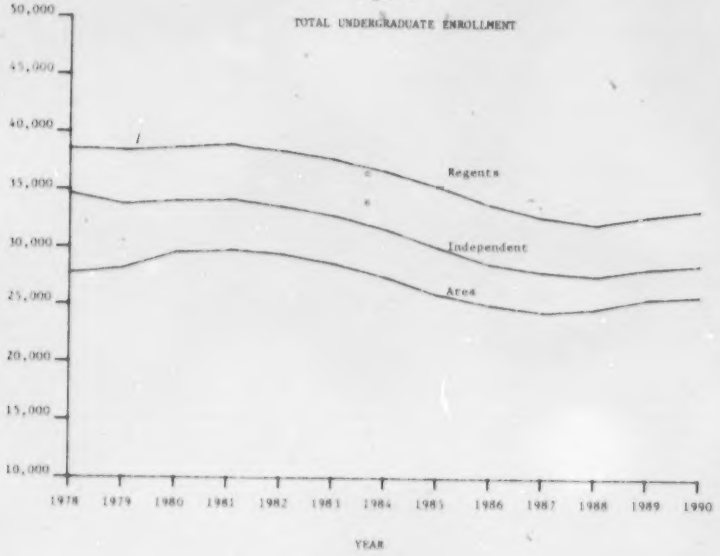


Figure 7

F.T.E.E.

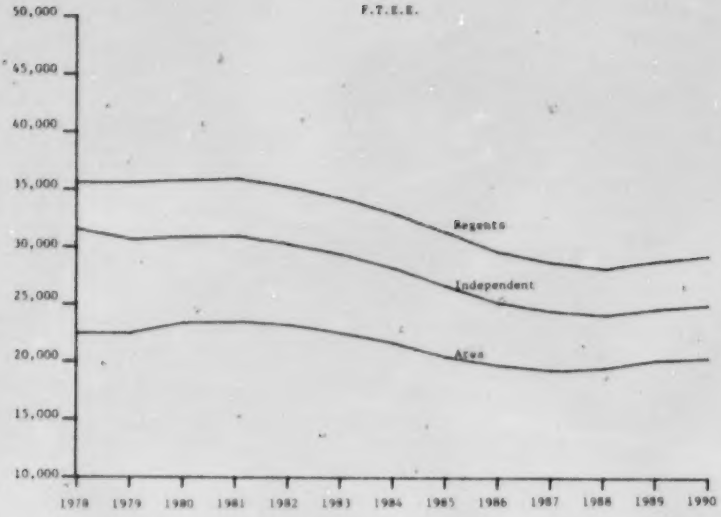


Figure 8

GRADUATE ENROLLMENT

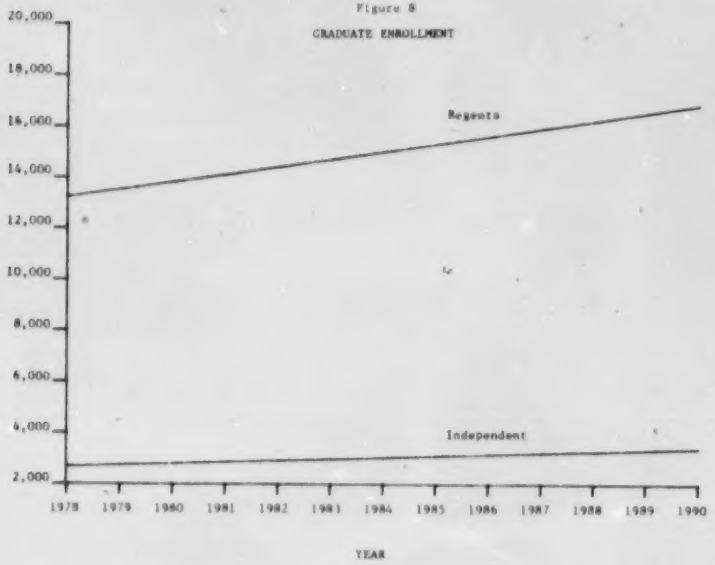


Figure 9

TOTAL ENROLLMENT

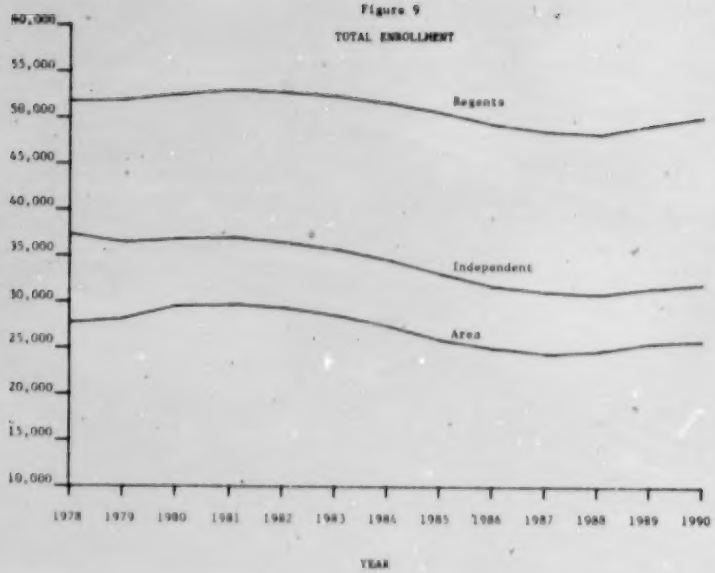
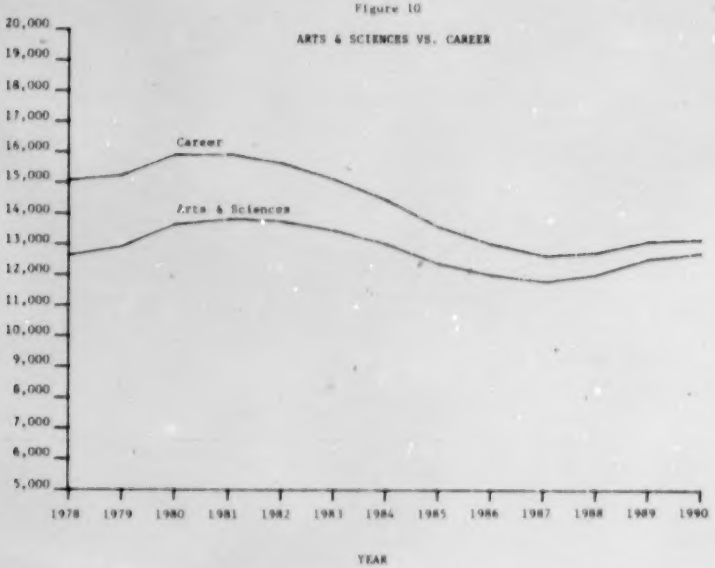


Figure 10

ARTS & SCIENCES VS. CAREER



INTERPRETATION OF THE PROJECTIONS

Regents Universities

Although only three institutions are included in this sector, each is unique. Two universities are comprehensive, offering degrees at all levels (except the associate). One university offers only one program at the doctoral level. It is not as comprehensive as the other two universities, particularly in the professional fields (except education). These and other differences are masked by sector-wide projections.

First, despite the masking of these distinctive institutional characteristics, the projections in this sector follow the general pattern of the other two sectors. Enrollments will increase until 1982, when a decline will begin and continue through 1988.

Second, it is assumed that the numbers of part-time students in this sector will increse annually until 1986, at which time they will level off. Not only will these institutions attract a substantial number of part-time core students, but some of these additional part-time enrollments will come from new external degree programs, such as the BLS, and new experiential learning options. Nevertheless, we do not believe part-time students in this sector will represent more than 12.5% of the total enrollment. The projection for 1990 represents approximately 18% of the total undergraduate enrollment as part-time.

Third, the graduate programs are distinctive contributions of the universities, just as career education programs are distinctive contributions of the area schools. During the 13-year projection period, graduate enrollments are expected to increase approximately 22%. This represents a head count increase of 3,598. Obviously, certain assumptions are made which lead to projecting a continuing increase in graduate enrollments throughout the period when undergraduate and total enrollments in this sector will be declining for part of the period. We assume that increasing numbers of people will seek advanced degrees with the hope that it will place them in a more marketable position, or in a higher salary range.

The peak total enrollment of fall, 1981, will not be reached again during the 13-year period of this projection. The low point of total enrollment is projected for the fall of 1988. In the space of eight years (1981-1988), total enrollments in this sector will decline from 52,777 to 48,311, or approximately 9%.

Conclusion. The comprehensive nature of the universities makes projections even more difficult than those for single purpose colleges. Experience has shown that demand for professionally trained people (i.e., engineers,lawyers) can change rapidly. Moreover, while many prognosticators believe enrollments will rise at the master's degree level in many areas, they will go down at the same time in certain disciplines at the doctoral level.

Independent Colleges

An initial caveat must be introducted as a backdrop for any interpretation of the projections in the independent sector. This comparatively large group of colleges represents a wide variety of institutions. However, this variety is masked by presenting the data for the sector as a whole. Such differences include the fact that a few of these colleges are two-year, junior colleges. Also, one of these institutions is a university, which enrolls most of the graduate students in this sector and a large proportion of the undergraduates. While the remainder of the colleges are four-year, mostly single purpose institutions, they too differ widely. Some of them are quite cosmopolitan and draw from a wide regional and national base. Many others are more local, drawing heavily from a near geographic area, or from a particular constituency.

First, it should be noted that the over-all projection in this sector follows the general trend of the other two sectors. This is to be expected in view of the fact that each is drawing from the same population pool of potential college-going students who survive with their cohorts through high school. It is known that this pool will decrease in the early 1980's and will increase in the late 1980's.

Second, it is assumed that the number of part-time students in this sector will increase annually over the entire period of the projection. It is expected that colleges will make a concerted effort to attract part-time core students, and particularly those colleges which are more local in nature and/or are located in cities. Unless there is a significant change in the residential character of most liberal arts colleges, we do not believe part-time students would ever represent more than 20% of the total student enrollment in this sector. The projection for 1990

approaches this with approximately 17% of the total undergraduate enrollment comprised of part-time students.

Third, graduate enrollments in this sector are projected to increase 22% during the 12-year projection period. However, this represents a head count increase of only 728. Clearly, except in the case of the one university in this sector, graduate education is not generally accepted as part of institutional mission. It is true that a few four-year colleges offer the master's degree in a few areas (particularly in education). Nevertheless, experience has shown that the mounting of extensive graduate programs in most areas, even at the master's level, is expensive. It is not believed that colleges would generally increase their program commitments at the graduate level.

Fourth, the expected decline of total enrollment in this sector from fall 1978 to fall 1979 is not interpreted as the beginning of the general enrollment decline, which will begin nationwide, probably in the fall of 1982. Rather, the entering class in the fall of 1975 was larger than usual, probably due to the scarcity of jobs and the recession in the economy of the country. Inflation and the rise of student tuition and fees the next year (1976) prevented a second year boom. Consequently, the graduating class of 1979 should be unusually large and, thus, deplete total enrollments noticeably.

The peak total enrollment of fall, 1978, will not be reached again during the 13-year period of this projection, although it will be approached in the fall of 1981.

The low point of total enrollment is projected for the fall of 1988. In the space of eight years (1981-1988), total enrollments in this sector will decline from 37,043 to 30,912, or approximately 16%.

Conclusion. If one compared the full-time equivalent (FTE) undergraduate enrollments of the three sectors, it is significant that the independent sector serves roughly a third of all undergraduates in the state. Of course, the area schools enroll undergraduates in the freshman and sophomore years only; moreover, the FTE figure for the area schools includes non-arts and science students in career education programs. The FTE undergraduate figures in the regents' universities also include non-arts and science students who are enrolled in undergraduate

professional colleges. The share of the load of arts and science undergraduates which is carried by the independent colleges is significant. Together with the other two major sectors, these colleges provide an appreciable option for potential undergraduate students in Iowa.

Area Colleges

The enrollment figures in the projections for the area college system include only the arts and science and career education programs. Excluded from the projections are the adult and continuing education enrollment and students of high school age who are enrolled in area college career education programs.

The area college system, having been in place in Iowa only 12 years, is still undergoing changes. Four major Iowa cities are currently not served by the area college arts and science programs, and numerous smaller communities have limited access to the vocational-technical services of their college. These projections are based on the assumption that there will be no changes in the number of communities served, by either the arts and science or the career program. Any changes in this regard could have major implications for the projections.

First, the total enrollment projection for 1978 of 27,736 students in the area colleges is projected to increase through the year 1981 to 28,813, an increase of 1,077 students or approximately 4% growth. Beginning in 1982, projected enrollment will drop at about the same rate as in the other sectors until 1987 and then begin to climb. The projected low enrollment figure of 24,954, which will occur in 1987, represents a decrease of 3,859 students, or 14% below the 1981 figure.

Second, the projections for area college enrollment deviated markedly from the other two sectors, due to a large number of adult (over 20 years of age) enrollments in this sector. This is a continuation of the trend of an increasing portion of the area colleges' enrollment accounted for by the "over 20" student. The 1978 in-state freshman enrollment figure of 12,956 was arrived at by multiplying the direct-from-high school freshman figure by 1.946. As the ratio of "over 20" to direct-from-high school enrollment changes from its present 48% figure to our projected 55% figure in 1990 the total will become even more dependent on the accuracy of this trend. Because of the declining curve

of new freshmen and the increasing ratio of "over 20" enrollment will become the larger figure. In 1978, 6655 direct-from-high school students are projected, and 6301 "over 20" aged student enrollments are projected. In 1987, when total enrollment reaches its nadir, there is projected to be 5,126 direct-from-high school enrollments and 6,135 "over 20" enrollments.

Third, the area collges have in the past attracted a minimal number of our-of-state enrollments and we project this trend to continue. The total freshman figure was multiplied by 4% to give us our projected out-of-state enrollments. In 1978 this formula gave us 519 out-of-state enrollments for the total area college system. In the peak enrollment year, 1981, out-of-state enrollments are projected at 552 students.

Fourth, the projections for part-time enrollments in the area colleges presents a difficult set of variables to deal with. Beginning with our narrow definition of which part-time enrollments to count, the rate was projected to continue to rise, but at a decreasing rate from its present 31% to over 40%. In 1978 it was projected that there would be 7847 part-time students enrolled. The maximum part-time enrollment was projected to occur in 1981 when 9386 part-time students are expected to be enrolled.

Fifth, the mix of career education and art and science students is very difficult to project using only the past trends as an indicator. The increasing popularity of career type educational programs at all institutions attests to the potential for continued growth of enrollments in these programs. At the same time the high cost of such programs and the tight control exerted by outside agencies on the growth of these offerings in the area schools at least serve to dampen the peak enrollment figure.

PROCEDURE FOR USING INTERACTIVE MODEL

To project future post-secondary enrollments several programs have been constructed. Most of these are developed to handle specific data-analysis on a one-time basis for input into the current projection. But two are designed and constructed specifically as interactive tools to project enrollments based on the data of the other programs, and on assumptions and user given values of variables. These two programs are designed to demonstrate the way that a non-prescriptive projection program can aid decision-makers by allowing them to test alternative sets of assumptions about what the future might bring. Operating these two programs is quite easy if the instructions given below are followed.

The reason for having two programs is that each program displays the results in a different manner. "MODEL1" displays the results in a tabular form, while "AMODEL" displays the results in a graphic format. Also, MODEL1 can be run on any terminal, including printing terminals, while AMODEL can be run only on an HP-2648, a type of terminal that has graphics capabilities. For acquiring exact numeric results MODEL1 is preferable, while to visualize the projection over the entire period, AMODEL is preferable.

General Features of Computer Terminals

Before going into the specific operating procedures for the printing (MODEL1) and graphics (AMODEL) versions of the enrollment projection model, there are some generally applicable features that will help you to use all terminals and to use them more effectively. First, always press the RETURN key after you have finished typing. This lets the computer know that you have finished; it has no other way of knowing and will wait all week for the signal provided when you type return. Second, the keys on a terminal can send more than just upper and lower case alphabetic and numeric characters to the computer. Depending on the terminal and the computer system, the keys can produce three or four characters. These "extra" functions are obtained by holding the control key (usually marked CNTL) while another key is typed -- the same way as

you hold the shift key down to get capital letters on an ordinary typewriter.

You will find two standard "control" characters particularly useful. The first is control H. This character allows you to back space -- one back space for every time the H key is depressed -- while holding down the control key. If you make a mistake, and note it before you depress the return key, you need only press control H the number of times that you need to back space, and correct the mistake. You must then retype all of the letters following the mistake because they have been erased from the computer's memory as well as the error.

The second control character that is very useful is control X. Control X cancels the entire line. This is particularly if – like me – you're a poor typist and are apt to make several mistakes per line. If you note the mistake before you have pressed the return key you may erase the computer's memory of the line, to start over by typing control X – this avoids numerous nasty remarks by the computer. So, if you notice a mistake in typing you can control H back to it and then continue on, or you can cancel the line by typing control X and then retype the line. Which you do will depend on you and your typing abilities.

To Use the Graphics Version

To use the graphics version of the enrollment projection model, you must use an HP-2648 graphics terminal because the program is written specifically for this terminal. To run the program you must first "log in" to IOWA 03. This is done by following a number of steps in an exact order. There are two procedures to go through to log in, depending on whether you're in the University of Iowa Computer Center or at a remote site.

Logging In at the Computer Center

To log in at the computer center:

1. Turn the HP-2648 on, using the switch in the rear
2. Set the "Gandalf" switch to gandalf
3. Check the keyboard's upper left hand corner to see that:
   A. the "DUPLEX" setting is on "FULL"
   B. the "PARITY" setting is on "NONE"
   C. and the "BAUD RATE" is on 2400

4. Make sure that the "REMOTE" key and the "AUTO LF" key are depressed
5. Press the "BREAK" key until the red light immediately above it light
6. Type: ?03 and pres the "RETURN" key. The computer will respond "SERVICE 03 START"
7. Press the "RETURN" key. The computer will respond "PLEASE LOG IN"
8. Type in "HEL-CO14, EZBAV, 1" (Note that the key marked CNTL is held down while you type in the underscored letters.)
9. Type in "exe-amodel" to begin the program. The program will begin at this point. A full explanation of the operation of the program can be found in the section entitled "Operation of AMODEL"

Logging In at a Remote Site

To run AMODEL at a remote site the HP-2648 must be attached to an acoustic coupler that allows the terminal to operate across telephone lines. The acoustic coupler should be attached by qualified personnel only. Once the coupler is attached to the terminal, you must:

1. Turn the HP-2648 on using the switch in the rear
2. Check the keyboard's upper left hand corner to see that:
   A. the "DUPLEX" key is set on "FULL"
   B. the "PARITY" key is set on "NONE"
   C. and the "BAUD RATE" is set on 300
3. Make sure that the "REMOTE" key and the "AUTO LF" key are depressed
4. Dial (319) 353-5310 and wait until you hear a whistling sound.
5. Put the telephone down on the acoustic coupler with the receiving end twoard you. Make sure that the receiver is well seated on the coupler
6. Depress the RETURN key. The computer will respond "PLEASE LOG IN"
7. Type "HEL-CO14, EZBAV, 1". (Note that the key marked CNTL is held down while you type in the underscored letters.)
8. Type in "exe-amodel" to begin the program. The program will begin at this point. A full explanation of the operation of the program can be found in the section entitled "Operation of AMODEL"

To Use the Printing Version

To use the printing version of the enrollment projection model, you can use any printing or cathodray tube (CRT) type terminal. To run the program (MODEL1) you must first "log in" to IOWA 03. You must exactly follow one of the two procedures described below in order to log in. The procedure you use will depend on whether you're at the University of Iowa Computer Center or at a remote site.

General Procedures for Using the Projection Models

The present enrollment projection models, AMODEL and MODEL1, are only preliminary models. They have been designed and constructed to demonstrate the feasibility for non-prescriptive modeling of enrollment projections. Both models are divided into three sections: the data base, the list and changes variables, and the projections.

Data Base

The Data Base section (shown below) makes listings of the input into the models. No changes can be made to this data as it is considered the initial input into the models. This section is identical in both models. This input includes the current enrollments (1977) and a seven year (1970 - 1976) average cohort survival ratios by class for the state. Using these two sets of figures the number of high school graduates is projected for the years 1978 to 1990.

Data Found in the Base Data File

1. The 1977 school population by grade
2. The cohort survival rates by grade
3. The number of high school graduates

List and Change Variables

The list and variable change section enables you to list and change any of several variables used in the projection. A list of

these variables is shown below. The program is designed for easy use of the various change options. Many fewer variables can be changed in the preliminary enrollment projection model than in the full scale model and they are much more coarse in their affects on the projections.

1. college going rates for full time students (male and female)
2. undergraduate out-of-state to in-state student ratio
3. number of entering freshmen over 20
4. retention rates by class year by sector
5. percent of entering part-time students by sector
6. growth rates of graduate students by sector
7. ratio of arts and sciences to career education in area schools

A full discussion of the method used to change the variables is found in the sections Operation of AMODEL and Operation of MODEL1. The default values of the variable can be found in the Assumption section.

Projections

The projection section takes the base data and the variables that the user has set up or the variables' default values and projects several enrollment variables. These variables are shown in the following table.

1. Number direct from high school
2. Number of in-state students
3. Total full-time freshman enrollments
4. Total full-time undergraduate enrollments
5. Total part-time undergraduate enrollments
6. Total undergraduate enrollments
7. F. T. E. undergraduate enrollments
8. Total graduate enrollments
9. Total enrollments
10. Area school enrollment divided into career and A & S

The predicted values of each of these variables, using the default values of the indpendent variables, can be found in the Results section. The actual methods used for the projection are found in the Appendix.

Logging In at the Computer Center

To log in at the Computer Center:

1. Turn on the terminal - you may have to hunt because the switch is located at different places for different terminals.
2. Set the terminal to run at its maximum BAUD RATE (up to 2400)
3. Set the "DUPLEX" switch to "FULL"
4. Depress the "BREAK" key
5. Type in: ?03
6. Depress the "RETURN" or "CAR RTN" key
7. Depress the "linfeed" key (marked LF many times)
8. Type "HEL-CO14, EZBAV" (Note that the key marked CNTL is held down while you type in the underscored letters.)
9. Type in "exe-model1" to begin the program. The program will begin at this point. A full explanation of the operation of the program can be found in the section entitled "Operation of MODEL1"

Logging In at a Remote Site

Running MODEL1 at a remote site requires much the same procedure as running AMODEL. An acoustic coupler must be attached to the terminal to operate across the telephone lines. Once the coupler is attached and the terminal is plugged into power you must:

1. Turn on the terminal - you may have to hunt because switches are located in different places on different terminals
2. Set the terminal to run at its maximum BAUD RATE (up to 2400)
3. Set the "DUPLEX" switch to "FULL"
4. Dial (319) 353-5310 and wait until you hear a whistling sound
5. Put the telephone down on the acoustic coupler with the receiving end toward you. Make sure that the receiver is well seated on the coupler
6. Depress the "RETURN" or "CAR RTN" key. The computer will respond "PLEASE LOG IN"

7. type "HEL-CO14, EZBAV, 7" (Note that the key marked CNTL is held down while you type the underscored letters.) When the computer has finished typing the banner,
8. type in "exe-model1" to begin the program. The program will begin at this point. A full explanation of the operation of the program can be found in the section entitled "Operation of MODEL1"

Operation of AMODEL

As soon as you have executed AMODEL it will ask you if you would like to see any of the base data. If you do, type "yes" (or "y"); otherwise hit the RETURN key. There are three inputs into the program (see Table 1). At this point you will be asked if: Would you like to see: a List, the Value, or Change the value of any of the variables? In other words at this point you can have a list of the independent variables (the ones you can change) by typing "L"; see the value of a particular variable by typing "V"; or change the value of a particular variable by typing "C". When you ask for the list it will come out immediately. But for looking at or changing a particular variable you must tell the program which variable you want to work with. This is done by answering a series of questions. At the end of the List, Value, and Change routines you will be branched back to the initial question (as given above). Also if you type something in that the program doesn't expect you will be branched back to this question. This allows you to work with as many of the variables as you desire during any one iteration.

When you have finished making all of the changes that you desire for a given iteration of the model, you go on to the projection section by typing in "n" or simply hitting the RETURN key. At this point you will be asked to choose one of the ten projections (noted in Table 3). You type in the number of the projection, hit RETURN, and wait. At this point there will be a great flashing of lights, the screen will go blank, and finally the projection will appear. When it has finished the projection it will ask you: "Do you want to continue?" If you do, type "y"; otherwise type "n". If you do continue, you will branch back to the start of the second section. All variables will be reinitialized at their default values. So you must respecify any value of any variable that you want to keep as it was in the previous iteration.

Operation of Model1

The first two sections of MODEL1 operate in exactly the same fashion they do in AMODEL. The third section, the projection operates in a much different manner from the user's perspective. When you finish the second section, the program immediately begins to print all of the projection in tables by year, starting with 1978 and continuing to 1990. The program will then ask you if you want to continue. If you do, type "y" and it will branch you back to the start of the second section. As with AMODEL, the variables are all reset to their default values; so you must change the variable back if you want to continue to work with that variable.

APPENDIX

THE MODELING PROCEDURE

The model that was programmed into AMODEL and MODEL1 is basically a cohort survival type demographic model. No attempt was made to incorporate non-demographic variables. The base data for the model is the total number of high school graduates by year for 1978 through 1990 and the enrollments by sector for 1977. The total number of high school graduates is calculated using the cohort survival method.

Step 1

The direct-from-high school freshman enrollments are calculated by multiplying the total number of men and women in the pool of high school graduates by the college going rate for the sector. The college going rate is calculated using a moving average. For example, the 1978 projection is based on an average of the four previous years. The 1978 area college figure of 6655 students was calculated by multiplying the total pool of student by 6.4% time .49 (for the number of males), plus 7.8% time the total pool of students time .51 (for the number of females).

values of the variables that control the first time enrollments were determined using this approach. But the part-time retention rates were calculated in the same manner as the full-time retention rates (see Assumption 8). It should be noted that variables controlling the first time enrollment rates follow trends that show up in what little data was available. It should also be noted that the definition used of part-time student deletes all of the non-traditional and non-credit students.

Step 6

The total undergraduate population is calculated by adding the part-time undergraduate enrollment to the full-time undergraduate enrollment.

Step 7

The full-time equivalent enrollment is calculated by multiplying the part-time enrollment by 1/3 and adding that number to the full-time enrollment. The figure of a part-time enrollee equaling 1/3 of a full-time enrollee is based on much research of the amount of time that a part-time student enrolls for.

Step 8

Like the calculation of the part-time enrollments, the calculation of graduate enrollments is hindered by problems with variables that are outside the scope of the model. So there is no way to measure the reliability or correctness of the figures even if traditional trend extrapolation is used. So again the scenario approach to projection was used. Following Assumption 9 the model made use of the national projections of Alan Cartter to set the default values of the variables controlling the growth of the graduate population. The final value of the growth rate variable comes from a complex set of calculations, like the part-time enrollments. In any one year there is a rate of change and a change in the rate of change, that must be added to the previous year's growth rate to get the current growth rate. The user has the option of changing any of these; the growth rate, the yearly change in growth rate, or the change in the yearly change of the growth rate of graduate enrollments. Once the value of this variable is

established, the current graduate enrollment is multiplied by that value to get the new enrollment.

Step 9

The total enrollment is calculated by adding the graduate enrollment in step 8 to the total undergraduate enrollment calculated in step 6.

Step 10

The Arts and Science versus the Career education projected enrollments are calculated by taking the total enrollment in the Area schools and dividing it by the projected percentage enrollment in the Arts and Sciences.

Step 11

When the model reaches this point it has finished projecting all the enrollments for that year. It then returns to step 1.

Step 2

The total in-state freshmen enrollment is calculated by multiplying the total direct-from-high school by the expected percentage increase due to freshmen over 20. The expected percentage of "over 20" is constant for the regents institutions (1.05) and the independent colleges (1.04). A changing percentage is used for the area schools because a trend was noted (see Assumption 8).

Step 3

The total number of freshmen was calculated by multiplying the total in-state freshmen population by the average percent of out-of-state students. These average percentages were calculated earlier for each sector. The analysis of this percentage shows that the area schools acquire only a minor number of new students from out-of-state, the regents institutions a larger percentage, and the independent colleges about 1/3 of their entire enrollment.

Step 4

The full-time enrollments are calculated using the cohort survival methods. Due to difficulties in obtaining uniform data on class level over a sufficiently large time period, analysis of any trends in the retention rates of students in any of the sectors was impossible. Also, in what data that was available no trends were found. For the actual values used, see Assumption 7.

Step 5

Calculation of part-time (and graduate) enrollments is most difficult due to the lack of clarity of their definitions and because they are influenced by variables independent of the demographic variables used for full-time undergraduates. Because the definition is constantly fluctuating there is little data available across time which complicates the problem of spotting trends in enrollments. In this setting the Delphi and the scenario approaches are most appropriate. The scenario approach was chosen because of the availability of expertise on the team – with respect to all of the sectors. So the default